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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,124	06/20/2003	Zhong-Wei Chen	021773-000220US	6012
20350	7590	06/09/2004	EXAMINER	
TOWNSEND AND TOWNSEND AND CREW, LLP TWO EMBARCADERO CENTER EIGHTH FLOOR SAN FRANCISCO, CA 94111-3834			BERMAN, JACK I	
			ART UNIT	PAPER NUMBER
			2881	

DATE MAILED: 06/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/601,124	CHEN, ZHONG-WEI	
	Examiner	Art Unit	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 2-20, 23-26, 28 and 29 is/are rejected.
- 7) ☒ Claim(s) 21, 22 and 27 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>6/20/03, 11/10/03</u> . | 6) <input type="checkbox"/> Other: ____. |

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

In response to this requirement, please provide copies of each publication which any of the applicants authored or co-authored and which describe the disclosed subject matter of swinging objective lens criteria. In the process of searching the prior art, the examiner discovered a citation to an article entitled "The Optical Properties of 'Swinging Objective Lens' in a Combined Magnetic Lens and Deflection System With Superimposed Field". This article was co-authored by the applicant and published in the journal *Optik*, Volume 64, pp. 341-347 in 1983. The examiner has been unable to acquire a copy of this article.

The fee and certification requirements of 37 CFR 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of this requirement under 37 CFR 1.105 that are included in the applicant's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this requirement and any information disclosures beyond the scope of this requirement under 37 CFR 1.105 are subject to the fee and certification requirements of 37 CFR 1.97.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

Claim 3 is objected to because of the following informalities: "b3eam" in line 3 is clearly a typographical error. Appropriate correction is required.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5, 11-20, 23, 25, 26, 28, and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 claims an objective lens system as recited in claim 2, wherein the lens is an electrostatic lens, but claim 2 requires a lens adapted to generate a magnetic field in a vicinity of the specimen to focus the particles of the particle beam on the specimen. The use of the magnetic field by the lens claimed in parent claim 2 to focus the particles inherently defines the lens as a magnetic lens. Since an electrostatic lens, by definition, uses an electrostatic field to focus charged particles instead of a magnetic field, dependent claim 5 directly contradicts parent claim 2. Claims 11-13, 25, and 26 all depend, either directly or indirectly, from claim 2, but they all contain limitations on "the deflection unit" for which the only antecedent basis is in claim 3. For purposes of examination, claims 11-12 and 25 have been treated as if they depended from claim 3, but any amendments must correct the mistaken dependency. Claims 14, on the other hand, along with claims 15-17 which depend from it and claim 23, cannot be reconciled with claim 3 because claims 14 and 23 contain limitations on "the deflection unit located within the central bore of the magnetic lens" and claim 3 only requires "at

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least one deflection unit located either in a retarding field of the beam or located within the central bore of the lens”, and therefore does not necessarily encompass a deflection unit located within the central bore of the magnetic lens since the “at least one deflection unit” may be located in the retarding field of the beam. Similarly, claim 13 and claim 18, along with claims 19 and 20 which depend from claim 18, cannot be reconciled with claim 3 because claims 13 and 18 contain limitations on “the at least one deflection unit positioned [or located] in the retarding field” and claim 3 does not necessarily encompass such a deflection unit since the “at least one deflection unit” may be located in the central bore of the magnetic lens and not in the retarding field. Furthermore, with respect to claim 23, there is no antecedent basis in the claims for the plurality of deflection units required to have deflection units having different diameters. Claims 14-20 and 23 are therefore so inconsistent that they cannot be compared to the prior art. Claim 28 depends from claim 23, but the only antecedent basis for “the four groups” is in claim 27, so for purposes of examination, claim 28 has been treated as if it depends from claim 27. Similarly, claim 29 has been treated as if it depends from claim 28 since that claim provides the only antecedent basis for “the X-direction and Y-direction groups.” Again, correction is required.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, 6-10, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,194,729 to Weimer in view of U.S. Patent No. 5,023,457 to Yonezawa.

Weimer discloses a lens system for focusing a primary particle beam, which may be an electron

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beam, and moving the focused primary particle beam on a specimen to be examined and collecting a plurality of secondary electrons and back-scattered electrons generated by the primary beam colliding with the specimen, the system comprising:

a lens (objective 6) adapted to generate a magnetic field in a vicinity of the specimen (located on object holder 10) to focus the particles of the particle beam on the specimen, the lens having a central bore through which the particle beam travels, said central bore being axially symmetric about the beam axis and having a beam-defining aperture (the unlabeled aperture in the detector) at a point where the primary particle beam enters the central bore and a lens aperture at a point where the primary particle beam exits the central bore of the magnetic lens;

an annular detection unit (16) within the central bore and located within a vicinity of where the primary particle beam enters the central bore, the detection unit collecting back-scattered electrons and secondary electrons generated by the primary beam colliding with the specimen, the detection unit positioned to capture the back-scattered electrons and secondary electrons traveling along the beam axis in a direction opposite to the primary beam;

an aperture within the annular detection unit;

an electrode (9) having a potential adapted to provide a retarding field to the particle beam near and at the specimen to reduce an energy of the particle beam when the particle beam collides with the specimen; and

a deflection system including at least one deflection unit (11) having an aperture larger than the aperture of the annular detection unit along a beam axis for deflecting the particle beam to allow scanning of the specimen, said at least one deflection unit located within the central bore of the lens.

While Weimer does not describe the lens (6) as an immersion lens, the lens illustrated in the drawings is identical to the conical lens described by Yonezawa and illustrated in Figure 3 of the Yonezawa patent. At lines 26-27 in column 1, Yonezawa teaches that this lens does not have sufficient resolution to observe semiconductor wafers. Therefore, Yonezawa teaches to replace such a conical lens with what Yonezawa calls a “unipolar magnetic field type objective lens”. This lens is identical to the “side-pole magnetic lens” disclosed in the instant application and inherently acts as the same type of immersion lens by generating the magnetic field of the lens in the vicinity of the specimen. It would have been obvious to a person having ordinary skill in the art to apply the teachings of Yonezawa to the Weimer apparatus by replacing Weimer’s conical lens with Yonezawa’s side-pole magnetic lens in order to achieve the increased resolution discussed by Yonezawa. Weimer does not address the size of the aperture within the annular detection unit, but this would have been a matter for routine experimentation and a person having ordinary skill in the art would adjust this in accordance with the desired resolution of the system.

Claims 11, 12, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weimer and Yonezawa as applied to claims 2-4, 6-10, and 24 above, and further in view of U.S. Patent No. 4,945,246 to Davis et al. While Yonezawa discloses the use of a plurality of deflection units (7) inside the central bore of the magnetic lens (5), the patent does not discuss how the deflection units are operated. At lines 25-37 in column 10, Davis et al. teaches that when a plurality of deflection units is used to move an electron beam over a large area on a substrate, a first group of the plurality of deflection units should deflect the particle beam, with a speed that is slow relative to the scanning speed of the beam, to position the beam at a starting position over an area to be scanned, and a second group of the plurality of deflection units should move the

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particle beam in a scanning motion over the area so that an image of the area can be constructed. It would have been obvious to a person having ordinary skill in the art to operate the plurality of deflection units that Yonezawa teaches may be provided in an objective lens system such as that disclosed by Weimer in the manner taught by Davis et al. in order to achieve Davis et al.'s movement of the electron beam over a large area and thereby examine that large area. Davis et al. also teaches, at lines 9-17 and 34-38 in column 6, that such deflection units may be electrostatic deflection units.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weimer, Yonezawa, and Davis et al. as applied to claims 11, 12, and 25 above, and further in view of U.S. Patent No. 5,719,402 to Satoh et al. Davis et al. does not discuss the structure of the electrostatic deflection units, but at lines 18-36 in column 3, Satoh et al. teaches that it is known in the art to form such a unit as a plurality of conducting segments, each segment being insulated from the others and a substrate for supporting the conducting segments, the substrate having a hole surrounded by the conducting segments and through which the primary particle beam passes; and wherein a voltage is applied to at least two of the segments to deflect the particle beam traveling through the deflection units. It would have been obvious to a person having ordinary skill in the art to use the known electrostatic deflection units described by Satoh et al. as the nominally recited electrostatic deflection units recited by Davis et al. in the Weimer/Yonezawa/Davis et al. apparatus discussed above.

Claims 21, 22, and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Claims 28 and 29 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:
The available prior art does not teach to supply the deflection unit with a voltage that meets the first order swinging objective retarding immersion lens criteria claimed in claim 21.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 6,617,587 to Parker et al. teaches, at lines 25-50 in column 9, that a dodecapole deflector, the type of deflector preferred by Davis et al. as is cited at line 16 in column 6, should be formed with twelve conducting segments arranged in four groups of three segments each.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jack I. Berman
Primary Examiner
Art Unit 2881

jb
6/3/04